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THE KENT INCORPORATED SOCIETY
FOR PROMOTING EXPERIMENTS IN
HORTICULTURE

SUPPLEMENTARY
ANNUAL REPORT

(TWENTY-FOURTH YEAR)

GENERAL DEVELOPMENT AND ACTIVITIES

EAST MALLING
RESEARCH STATION

EAST MALLING

KENT

1st January, 1936, to 31st December, 1936

Published May, 1937

GOVERNING MEMBERS OF THE SOCIETY

(Appointed under the Revised Articles of Association, June 1936)

Appointed by the Ministry of Agriculture:

Sir FREDERICK W. KEEBLE, Kt., C.B.E., D.Sc., F.R.S., Cedron House, Fowey, Cornwall.

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Appointed by the Council of the Senate of the University of Cambridge:

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Appointed by the Senate of the University of London:

Professor Dame HELEN GWYNNE-VAUGHAN, G.B.E., D.Sc., LL.D., F.L.S., 93 Bedford Court Mansions, London, W.C.1.

Appointed by the University of Bristol:

Professor B. T. P. BARKER, M.A., The Research Station, Long Ashton, near Bristol.

Appointed by the Governing Body of the Imperial College of Science and Technology:

Professor V. H. BLACKMAN, Sc.D., F.L.S., F.R.S., Imperial College, South Kensington, London, S.W.7.

Appointed by the Council of the Royal Society:

Professor E. J. SALISBURY, D.Sc., F.L.S., F.R.S., University College, Gower Street, London, W.C.1.

Appointed by the Governors of the South-Eastern Agricultural College, Wye:

ED. HARDY, Esq., C.C., Boughton Court, Ashford, Kent.

Lord NORTHBOURNE, C.C., Northbourne Court, Deal, Kent.

Appointed by the Research and Advisory Committee of the South-Eastern Agricultural College, Wye:

R. M. WILSON, Esq., B.Sc.Agric., South-Eastern Agricultural College, Wye, Kent.

Appointed by the Governors of John Innes Horticultural Institution:

Sir DANIEL HALL, K.C.B., M.A., F.R.S., LL.D., John Innes Horticultural Institute, Merton, Surrey.

Appointed by the Council of the Royal Horticultural Society:

E. A. BUNYARD, Esq., F.L.S., The Royal Nurseries, The Broadway, Maidstone, Kent.

Appointed by the Council of the Institute of Brewing:

H. W. HARMAN, Esq., 16 Southwark Street, London, S.E.1.

Appointed by the Research Fund Committee of the Institute of Brewing:

H. G. YOUNGER, Esq., Research Department, Institute of Brewing, Brewers' Hall, Addle Street, London, E.C.2. (*Resigned December*, 1936.)

G. T. COOK, Esq., Queen's Avenue, Maidstone, Kent. (*Appointed December*, 1936.)

Appointed by the National Farmers' Union (Central Council, London):

J. S. CHIVERS, Esq., Messrs. Chivers & Sons, Ltd., Histon, Cambridge.

J. E. SANDALL, Esq., Beechwood, Clarkson Avenue, Wisbech, Cambs.

Appointed by the National Farmers' Union (Kent Branch):

A. AMOS, Esq., Spring Grove Farm, Wye, Kent.

ALFRED DAY, Esq., J.P., Great Tong Farm, Headcorn, Kent.

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Sir AMBERSON B. MARTEN, Kt., M.A., LL.D., Gedges, Matfield, Paddock Wood, Kent.

D. J. MOOR, Esq., Nichol Farm, Teynham, Kent.

S. W. MOUNT, Esq., Hode Farm, Patrixbourne, Canterbury, Kent.

T. NEAME, Esq., The Offices, Macknade, Faversham, Kent.

J. A. RAYNHAM, Esq., Dairy Farm, Marden, Kent.

J. M. ROBERTSON, Esq., Beluncle, Hoo, Rochester, Kent.

J. F. TOWNER, Esq., Salts Farm, Loose, near Maidstone, Kent.

Appointed by the Council of the Horticultural Trades' Association:

L. J. COOK, Esq., 7 Drapers Road, Enfield, Middlesex.

Appointed by the Associate Members of East Malling Research Station:

Capt. R. WELLINGTON, Worth, Hele, Bradninch, S.O., Devon.

A. T. MILLER, Esq., Wested Farm, Swanley, Kent.

MEMBERS OF THE EXECUTIVE COMMITTEE

(Governing Members elected at the General Meeting, June 1936)

Professor B. T. P. BARKER, M.A.
Professor V. H. BLACKMAN, Sc.D., F.R.S., F.L.S. (Vice-Chairman).
S. S. BOORMAN, Esq.
J. S. CHIVERS, Esq.
L. J. COOK, Esq.
ALFRED DAY, Esq., J.P.
W. T. EDMONDS, Esq.
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H. W. HARMAN, Esq.
P. MANWARING, Esq., J.P.
S. W. MOUNT, Esq. (Chairman).
Lord NORTHBOURNE, C.C.
T. NEAME, Esq. (Chairman, Finance Sub-Committee).
J. M. ROBERTSON, Esq.
Professor E. J. SALISBURY, D.Sc., F.L.S., F.R.S.
J. E. SANDALL, Esq.
W. J. THOMAS, Esq.
Capt. R. WELLINGTON.

Co-opted Members:

H. V. TAYLOR, Esq., O.B.E., D.Sc.(Lond.), A.R.C.S.
Horticultural Commissioner, Ministry of Agriculture.
W. ROGERS, Esq., Court Lodge, Horton Kirby, Kent.

The Director:

R. G. HATTON, Esq., C.B.E., M.A.(Oxon.), D.Sc.(Lond.), V.M.H.

The Representative of Staff Council:

M. H. MOORE, Esq., Dip.Hort.Sci.(Reading).

STAFF

Director : RONALD G. HATTON, C.B.E., M.A.(Oxon.), D.Sc.Hort.(Lond.), V.M.H.

Assistant Director : H. WORMALD, D.Sc.(Lond.), A.R.C.S., D.I.C.

Technical Officer : N. B. BAGENAL, B.A.(Cantab.)

Pomology : R. G. HATTON,* C.B.E., M.A.(Oxon.), D.Sc.(Lond.), V.M.H.
N. H. GRUBB, M.S.A.(Cornell).
W. S. ROGERS, M.A., Dip.Hort.(Cantab.).
J. AMOS, N.D.H.
W. A. BANE, B.Sc.Hort.(Reading).
Miss A. B. BEAKBANE, B.Sc.Hort.(Lond.), N.D.H.
Miss M. E. RENWICK, B.Sc.Hort.(Reading). (*Resigned December* 1936.)
Miss M. G. WEBB, B.Sc.Hort.(Reading).
Miss C. P. FIELD, B.Sc.Hort.(Reading).
Miss E. C. THOMPSON.
Lab. Assistants : C. H. W. SLATER.
R. A. WARD.

Plant Breeding : H. M. TYDEMAN.

Propagation : R. J. GARNER, N.D.H., Dip.Hort.Sci.(Reading).
D. H. HAMMOND.

Marketing Investigations : A. C. PAINTER.
Miss B. L. WATES, B.Sc.Hort.(Lond.).

Hops : F. H. BEARD, Hort.Dip.(Wye).

Walnuts : A. W. WITT, N.D.H. (*Consultant*).

Statistics : T. N. HOBLYN, Hort.Dip.(Wye).
Miss J. L. EDGAR, B.Sc.(Lond.).
Lab. Assistant : Miss J. S. PLACKETT.

Plant Physiology : M. C. VYVYAN,* M.A.(Cantab.).
H. L. PEARSE, Ph.D.(Lond.), A.R.C.S., D.I.C., of the Imperial College of Science and Technology.
Lab. Assistant : G. F. TROWEL.

* Recognized Teacher of the University of London.

Bio-Chemistry : W. A. ROACH,* D.Sc.(Lond.), A.R.C.S., D.I.C., A.I.C.
B. G. F. LEVY, B.A.(Cantab.), Hort.Cert.(Reading).

Lab. Assistant : R. CORNFORD.

Mycology and Bacteriology : H. WORMALD,* D.Sc.(Lond.), A.R.C.S., D.I.C.
R. V. HARRIS, B.Sc.(Lond.), A.R.C.S., D.I.C.

Lab. Assistants : Miss K. CORNFORD.
Miss R. HOAR.

Entomology : A. M. MASSEE,* D.Sc.(Lond.), F.R.E.S.
R. M. GREENSLADE, B.Sc., A.R.C.S.

Lab. Assistant : F. CRONK.

Insecticides and Fungicides :

Chemistry : H. SHAW, M.Sc.Tech., Ph.D.
Lab. Assistant : R. N. PIERCE.

Entomology : W. STEER, B.A.(Cantab.)
R. G. GAMBRILL, *Recorder.*

Mycology : M. H. MOORE, Dip.Hort.Sci.(Reading).
H. B. S. MONTGOMERY, B.A.(Dublin), *Special Assistant.*

Guide Demonstrator and Exhibitions Officer : H. C. CHAPELOW, *Meteorological Records.*

Advisory Officers in Commercial Fruit Growing to the Kent Education Committee stationed at East Malling Research Station : W. G. KENT, N.D.H., and C. R. THOMPSON.

* Recognized Teacher of the University of London.

ADMINISTRATION.

Secretary : C. T. ROYLE.

Book-keeper : P. R. WOOD.

Director's Personal Secretary : Miss L. E. ALEXANDER.

Clerical Staff : Miss I. M. FISHER, Miss E. M. LAWSON, Miss J. M. COY, Miss J. M. CRAYFORD, Miss J. D. MARTIN and Miss M. I. SUNNUCK.

VISITORS.

Visits may be paid to the Research Station on any weekday *by appointment* (Saturday afternoon under exceptional circumstances only).

Passenger Station : East Malling Halt (Southern Railway).

Goods Station : Aylesford (Southern Railway).

Bus Services :

FROM MAIDSTONE by the Maidstone and District Motor Services Limited, every 20 minutes from Maidstone to East Malling Church.

FROM LONDON a regular service of Maidstone and District Coaches from the London Coastal Service Limited, Victoria Coach Station, Buckingham Palace Road, S.W.1, may be of assistance to Visitors. The Coaches call at East Malling on certain inward and outward journeys.

For Visitors coming by road DITTON CORNER on the main London-Maidstone Road (with Red Lamp Danger Signal) is the turning to the Research Station.

Telephone : Aylesford 7294 (2 lines).

Telegrams : Research, East Malling.

THE IMPERIAL BUREAU OF FRUIT PRODUCTION

accommodated at East Malling Research Station.

STAFF.

Director : RONALD G. HATTON, C.B.E., M.A.(Oxon.), D.Sc.(Lond.), V.M.H.

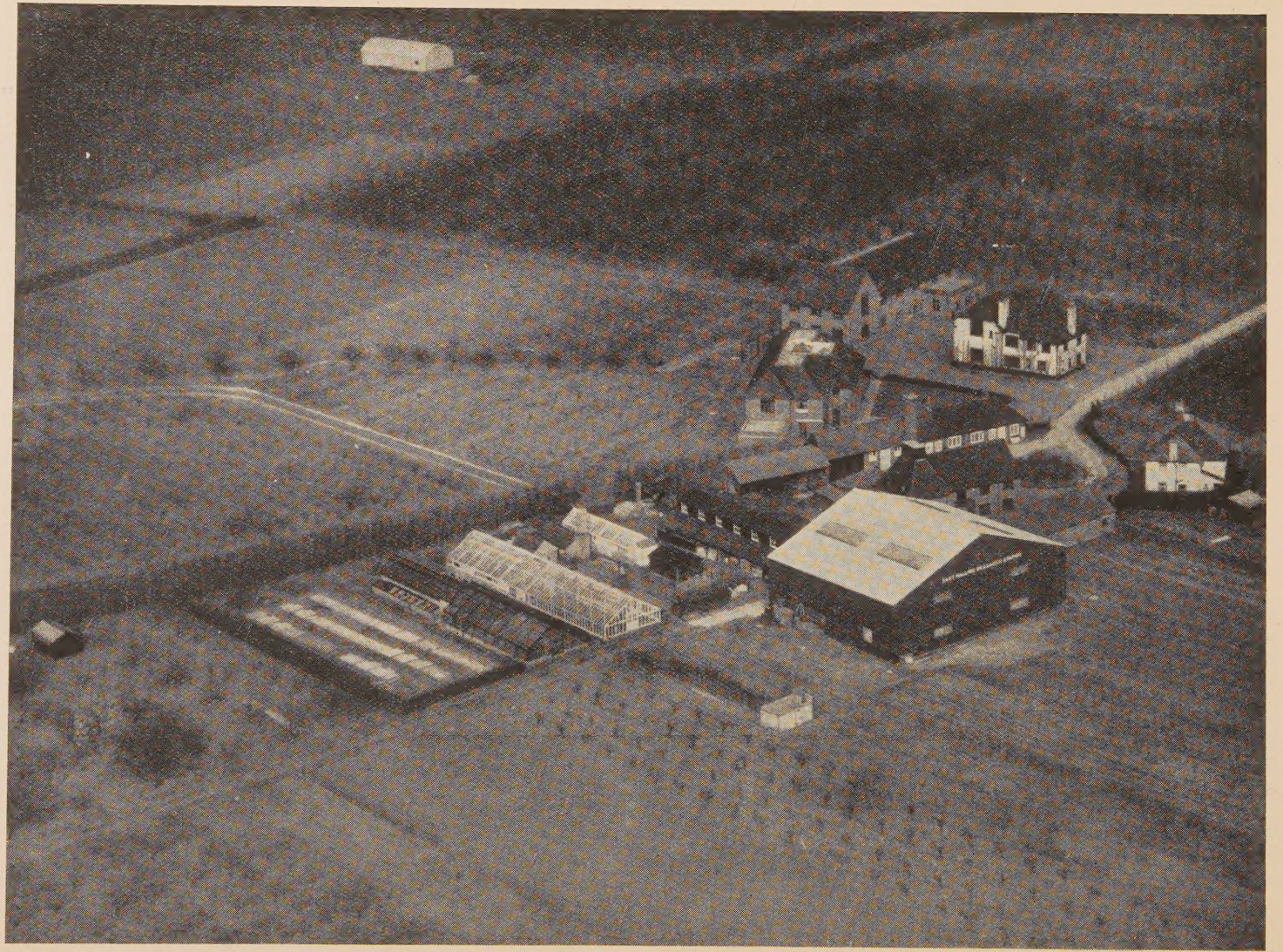
Chief Officer : D. AKENHEAD, M.A.(Oxon.), B.Sc.Agric.(London.)

Assistants : G. ST. CLAIR FEILDEN, B.A.(Oxon.)
G. K. ARGLES, Dip.Hort.(Wye), A.I.C.T.A.

Clerical Staff : Miss F. H. WHITEHEAD. (*Resigned, December* 1936.)
Miss M. B. ROGERS, Miss M. M. DURLING, and Miss F. R. L. CLEGGATT (appointed December, 1936).

Telephone : Aylesford 7188.

Telegrams : Fruitburo, East Malling.



AN AERIAL VIEW OF THE RESEARCH STATION BUILDINGS.

GENERAL DEVELOPMENT AND ACTIVITIES

EDITORIAL.

The year has been one of many changes. Since the incorporation of our Society in 1920, the name of Percy Manwaring has been inseparably linked with that of East Malling. As the persistent advocate of the benefits of research and education to the fruit growing industry, Mr. Manwaring fostered and developed the goodwill of the growers towards the infant institution in Kent, in whose growth they have since all shown such a keen interest. It therefore came as a shock to everyone when he announced his decision to resign the Chairmanship " to give the younger generation a chance ". Fortunately for the Committee, with which he had worked so long, and for the staff, who look upon him as a personal friend, Mr. Manwaring has consented to retain his active interests in the work of the Station. One and all express the wish that he may long be spared to give us the benefit of his ripe experience.

His successor in the Chair is Mr. S. W. Mount to whom we all extend a welcome and goodwill.

With the broadening of our constitution under the revised Articles of Association and the election of an Executive for the next three-year period, we welcome as new members men distinguished in the practical and scientific world of horticulture.

Perhaps the most acute problem at the moment for our new Committee, one which is apparent on almost every page of this Report, is that of the adequate accommodation of our research and administrative staff. When the last building was designed, it was thought that the problem was solved for a good many years to come, but, with the growth of activity in all sections, the matter has again become urgent.

The doubling, in the last eight years, of our Associate membership and the trebling of our visitors' list, together with the inevitable increase in our advisory and educational services, and the additional acreage of fruit in bearing have strained our administrative resources to the utmost. At the same time, the gradual increase in the number of assistants in research consequent upon the normal development of our programme, and the impetus given to our reception of a selected number of voluntary graduate workers following upon our recognition by the University of London, have resulted in a condition of serious overcrowding in the laboratories. There can be no doubt that from the point of view of the rapid development of our investigations, the practical contributions made by these latter workers have more than justified both the supervision entailed and accommodation occupied.

From a wider point of view these academic activities are valuable in contributing to the output of scientifically trained horticulturists.

Our contacts with the rest of the fruit-growing commonwealth, which have proved so mutually productive in the past, were maintained during the year by the reception of overseas workers, by the arrangement of exchanges of staff and by the visit of the Director to the Union of South Africa. Meanwhile the number of visitors at home is round about our record figure of over 3,000.

An outstanding event of the year was the three-day visit of our research staff to the Agricultural and Horticultural Research Institution, Long Ashton, Bristol. Not only were we privileged to be present at their annual Cider-tasting Day, and to view

the field trials but we were also given ample opportunities for a full joint discussion of our respective research programmes. These facilities, together with the generous hospitality extended to us by Professor Barker and his staff were not only stimulating intellectually but brought together the workers of the two institutions to their mutual benefit.

OBITUARY.

In view of our official connection with the University of London, we share in the loss of Sir Edwin Deller, its late Principal, of whose visit to the Station at the time of its recognition we have such happy memories.

Mr. Frederick Smith of Loddington, a great figure in the fruit-growing world of this country, who was almost certainly the first grower supporting this Institution, has passed away at the ripe old age of ninety-five. He was in the forefront of the movement to establish a fruit research station in Kent, and he may well be regarded as one of the chief pioneers of modern fruit growing in the South-East of England. Right up to the last he was always ready to give the benefit of his wide experience and mature wisdom. When he could no longer pay his regular visits to the Station, members of our staff were always made welcome at Loddington where they found him " full of wise saws and modern instances ".

COMMITTEES.

Revision of Articles of Association : As foreshadowed in last year's report, the revision of the Articles of Association, in order to give a broader basis of representation, was ratified at an Extraordinary General Meeting of the Society held in April, 1936.

As will be seen from the list of the Governing Body, this has meant an increase from twenty-nine to thirty-six members. It was thought highly desirable not to increase the Executive Committee to the same extent and this inevitably meant a certain re-distribution of representation on the Executive. We are particularly grateful to the South-Eastern Agricultural College, Wye, the Kent Branch of the National Farmers' Union and the Institute of Brewing for agreeing to this re-distribution, but we have in consequence to record with great regret the retirement of certain Governing Members from the Executive.

In recording the retirement therefrom of Professor Sir Roland Biffen, Mr. R. M. Wilson and Mr. H. G. Younger, under this arrangement, we tender our best thanks for their past support. We welcome Professor E. J. Salisbury (representing the Royal Society), Lord Northbourne (representing the Governors and the Research Committee, South-Eastern Agricultural College, Wye), and Mr. H. W. Harman (representing the Council and the Research Fund Committee of the Institute of Brewing).

As a result of the reduction in the representation of the Kent Branch National Farmers' Union, we lost the services of Mr. J. A. Raynham on the Executive Committee. He could always be relied upon to attend committee meetings and, in placing on record our gratitude for his unfailing support, we express the hope that as a Governing Member he may still retain his close interest in the Station.

Following the widening of our representation we are glad to welcome on this Committee the following additional members : Mr. S. S. Boorman and Mr. W. J. Thomas (representing the County Councils), Mr. J. Stanley Chivers and Mr. J. E. Sandall (representing Central Headquarters, National Farmers' Union), and Captain R. Wellington (representing the Associate Members).

Other new members on the Governing Body are Mr. A. T. Miller (representing the Associate Members), Mr. E. A. Bunyard (representing the Council of the Royal Horticultural Society) and Mr. G. T. Cook (representing the Institute of Brewing), to all of whom we extend a hearty welcome.

Twenty-two Committee Meetings were held—four being Executive Meetings—during 1936.

Executive Committee.

Under the revised Articles the Governing Members now have the power of electing the Executive Committee—previously, individual bodies had nominated representatives to this Committee. The new Executive Committee was therefore elected by the Governing Members at the Annual Meeting in June. The term of office has been approved for a period of three years, and the Committee have power to co-opt members —not exceeding three in number.

The first meeting of the new Executive Committee was held on 10th August. Mr. S. W. Mount, who had been the first Chairman of our Finance Sub-Committee, and had also acted as Vice-Chairman of the Executive, was on the proposal of Mr. Manwaring unanimously elected Chairman. It will be remembered that Mr. Percy Manwaring, who had been our Chairman ever since the date of the incorporation of the Society in April, 1920, sent a special message through Mr. J. Hillier French to the Annual Members' Day gathering, intimating his intention to resign the Chairmanship of the Executive Committee on the grounds that it was time a younger man took over these responsibilities. In accepting office, Mr. Mount expressed regret at Mr. Manwaring's irrevocable decision and asked that "our heartfelt appreciation of the services Mr. Manwaring had given to this Station and an assurance of our affection and esteem" should be included in the minutes.

Mr. T. Neame was re-elected Chairman of the Finance Sub-Committee.

Professor V. H. Blackman, who to our great advantage has always kept us in close contact with the Imperial College of Science, was elected to the vacant Vice-Chairmanship.

The Committee co-opted Dr. H. V. Taylor, together with Mr. W. Rogers for the current year. We wish to take this opportunity of congratulating the Horticulture Commissioner of the Ministry of Agriculture upon the degree of Doctor of Science (Horticulture) recently conferred upon him by the University of London.

Mr. M. H. Moore was elected Staff Representative on the Executive Committee for the year.

Annual Meeting.

The Sixteenth Annual General Meeting and Associate Members' Day were held on Thursday, 18th June. Details of the meeting and tour appear later in this report.

Sub-Committees.

The Executive Committee reviewed the terms of reference of all the Sub-Committees which have met during the year :—

The Finance Sub-Committee (Chairman, Mr. T. Neame), met four times. Much of the general business of the Station falls on this Committee which considers and makes recommendations upon all matters of finance.

The Buildings Sub-Committee (Chairman, Mr. Talbot Edmonds) has met on three occasions. The Committee has gone into the subject of main drainage very thoroughly with the local authorities, and plans have been prepared showing the most suitable method of connecting the Station premises with the main sewer. It is hoped that in the near future means may be forthcoming to give effect to the Committee's recommendations.

The Committee have also given consideration to the preliminary plans for additional office accommodation.

The Staff and Post-graduate Sub-Committee (Chairman, Professor V. H. Blackman) met in December. It reviewed and favourably reported upon the scheme for receiving a limited number of post graduate students.

The Plant Prices Sub-Committee (Chairman, Mr. Talbot Edmonds) held their annual meeting on Members' Day, and recommended the prices of experimental materials for distribution during the ensuing season.

The Hop Sub-Committee (Chairman, Mr. Arthur Amos) met in August. We much regret that Mr. J. D. Maxted felt he could not continue his Chairmanship. As Chairman of this Sub-Committee he had continuously maintained his connection with the Station of which he was the first Chairman when it was known as the Wye College Fruit Experimental Station (1913-20). We record our thanks to him and we are very glad that he has promised to remain a member of the Committee. Mr. Arthur Amos of Wye was unanimously elected to succeed him.

The Fruit Sub-Committee (Chairman, Mr. C. S. Smith) met in July when the Fruit Research Programme (Section II of the Annual Report) was considered.

The Annual General Meeting and Associate Members' Day.

The Twenty-third Annual General Meeting was held on Thursday, 18th June. The Sixteenth Ordinary General Meeting of the Society was held in the morning at Ditton Laboratory through the courtesy of the authorities, and was attended by 101 members. In the absence, through illness, of Mr. Percy Manwaring, Mr. Spencer W. Mount, Vice-Chairman, presided at the meeting. The Director presented the Twenty-third Annual Report and Supplement (1935). Captain R. Wellington proposed and Mr. Arthur Amos seconded the adoption of the Report and this was approved.

Mr. T. Neame, the Finance Chairman, then presented the Balance Sheet for the year ended 30th September, 1935. Mr. J. E. Sandall proposed and Mr. J. F. Towner seconded the adoption of the financial report and this was approved.

The Tenth Annual Meeting of Associate Members was held in the new packing shed at East Malling Research Station. Mr. Spencer Mount presided over a company of some 425 members and guests. The principal speakers were Colonel C. E. Ponsonby, T.D., M.P. (Member of Parliament for the Sevenoaks Division), Mr. Edward Hardy, J.P. (Chairman of the Kent County Council), and Mr. J. W. Pye (Chairman of the Kent County Branch of the National Farmers' Union).

In the afternoon the members were conducted in parties to different points of interest in the experimental plantations. Here short talks were given by the staff on various aspects of the problem of how to deal with large crops and at the same time how to keep fruit trees in regular bearing. Tea was served in the new packing shed.

Finance.

A summary of the Research Account and the Experimental Farm Account for the financial year, 1st October, 1935, to 30th September, 1936, is shown below. This statement does not include details of the Special Grants such as those for Insecticide and Fungicide Investigations, Walnut Culture, etc., but the gross receipts and expenditure on these items are shown as " Special Grants ".

The bank overdraft at 30th September, 1936, was £3,920 against a figure of £2,880 at 30th September, 1935.

While the Research Account calls for little comment, it must be remembered that it would show a fairly large deficit but for the fact that the Membership Fund is finding some £700 towards the Research and Administrative expenses.

We are again indebted to the Kent, East Sussex, West Sussex and Essex County Councils for their help during the past year. We also take this opportunity of expressing our thanks to the United Potash Co. for the continuance of their grant.

With regard to the Farm Account, whilst it was feared that there would be a very heavy loss as a result of the frost of 1935, we are happy to report that the total sales of produce were only reduced by approximately £700. In 1935 we were helped by the " carry over " of apples from 1934 in our Gas Stores. Although this was lacking in 1936. certain other crops were heavy and realized good values.

Research Account.

1st October, 1935, to 30th September, 1936.

Expenditure.	£	s.	d.	Income.	£	s.	d.
Research and Administrative Salaries and Superannuation	11,977	16	8	Grant from Ministry of Agriculture	14,458	15	8
Laboratory Expenses and Equipment	895	6	0	Contributions from Public Bodies	520	0	0
General Maintenance Expenses	2,740	10	10	Sundry Receipts	634	6	1
				Balance (being excess of expenditure over income)		11	9
	£15,613	13	6		£15,613	13	6
Special Grants :				*Special Grants :*			
Salaries and General Expenses	1,671	12	7	Balance in hand at 30.9.35 ..	155	1	11
Balance carried forward at 30.9.36	263	8	0	Sundry Grants	1,779	18	8
	£17,548	14	1		£17,548	14	1

Experimental Farm Account.

1st October, 1935, to 30th September, 1936.

Expenditure.	£	s.	d.	Income.	£	s.	d.
Farm Valuation as at 30.9.35	9,299	1	6	Farm Valuation as at 30.9.36	10,896	13	5
General Farm Wages ..	5,922	7	3	Ministry of Agriculture—Maintenance Grant	1,800	0	0
Manures and Sprays	855	12	9	Sales of Produce and Crops ..	7,266	17	0
General Hop Expenses ..	938	9	7	Balance (being excess of expenditure over income) ..	225	17	6
General Expenses	3,173	16	10				
	£20,189	7	11		£20,189	7	11

The difference in Valuation of £10,896 in 1936 as against £9,299 in 1935, is mainly caused by the valuation of fruit and crops unsold held this year (approximately £1,642) against a figure of only £636 in the previous year.

As mentioned in last year's report, the economies effected during the past two years have enabled the Farm to come through a most difficult period and, while developments and renewals are still in arrears, it is hoped that the coming seasons may provide the crops to make up some of these deficiencies.

Special Grants.

The Agricultural Research Council have renewed their special grant for the Investigations of Insecticides and Fungicides. We thank the Imperial Chemical Industries for providing, through its Research Committee, grants for assisting this work.

Arising out of the meeting held at the Station in the autumn of 1935, when a resolution was forwarded to the Ministry of Agriculture asking for consideration of proposals to initiate investigations upon Frost Damage, a provisional grant was made in January, 1936, to cover the expense of an initial survey. Later, as a result of a recommendation from the Ministry's Horticultural Meteorological Sub-Committee, a further temporary grant was given to investigate the air flow in its relationship to topography, frost occurrence and katabatic winds, the worker being stationed, in the initial stages, at East Malling.

We wish to record our best thanks to Mr. H. T. Barnett of Tilehurst for his interest in our Walnut investigations. Through his efforts approximately £80 has been collected which it is hoped will enable the work to continue in a small way until the autumn of 1938. Additional donations would be welcome as a further appreciation of the efforts which Mr. Barnett has so kindly made.

Membership Scheme.

The membership on 31st December, 1936, was 1,294, being an increase of 56 members since December of the previous year. The number of new members registered

Associate Members' Fund.

Receipts and Payments Account for the Year ending 30th September, 1936.

Expenditure.	£	s.	d.	Income.	£	s.	d.
To Contributions to Salaries and Grants	520	0	0	By Balance at 30th September, 1935	2,161	18	2
,, Stationery, Postages and General Office Expenses	100	0	3	,, Donations	136	12	0
,, Part cost of Printing and Postage on Annual Report	143	8	7	,, Subscriptions	1,410	17	2
,, Members' Day Expenses ..	130	6	1	,, Sale of Spray Calendars ..	4	16	2
,, Contribution to cost of Photographic Studio ..	6	19	6				
,, Contribution to cost of Director's Office ..	203	15	6				
	1,104	9	11				
,, Balance of the Fund at 30th September, 1936	2,609	13	7				
	£3,714	3	6		£3,714	3	6

was 120, but it is with regret that we have to record the loss of 15 members who died during the year and a further 49 whose membership has lapsed for various reasons.

It should be noted that every endeavour is made to ensure that the register is kept up to date and in this connection we take this opportunity of thanking Mr. J. Hillier French and his staff at the Kent Branch of the National Farmers' Union Headquarters, for their help from time to time.

It will be seen from the account below that, apart from the contribution towards the cost of running the Membership Scheme, a sum of approximately £730 has been provided towards salaries, equipment and extensions.

It is highly satisfactory that the membership is up to a figure of nearly 1,300 and we should like to record our gratitude to the members who have continued to support the Station. Their interest and influence is a very great encouragement to all the research staff. The election of two Associate Members to the Governing Body (one of these to the Executive Committee) is a recognition of their support by our members, and now gives them a direct voice in the government of the Institute.

Development and Endowment Fund.

It may be of interest to summarize briefly the position of the Trustees' Funds.

The total amount raised from all sources is approximately £4,876 to date. Part of the funds (£3,740) was invested in the purchase of two very important pieces of land adjacent to the Station properties, i.e. Kiln Field orchard (20 acres) in December, 1934, and Upper Deadman hop-garden (12 acres) in March, 1935. In addition the Trustees' Funds have provided a loan (£1,500) for the supply and erection of three Gas Store Chambers having a total capacity of 6,000 bushels.

The Station is now farming the Kiln Field and Upper Deadman lands for the Trustees and in return is allowed to use the land for research purposes. When these areas have been renovated and properly cultivated they should show an adequate return to the Trustees, such return being used for the further development of research activities.

Land and Buildings.

One of the most important problems raised during the year has been that of laboratory and office accommodation. The rate at which the work of the Station has increased may not be generally appreciated. Since the last building was erected in 1929-30 the number of members has more than doubled, and the number of those visiting the Station has trebled. These alone have brought a great increase in administrative and advisory work, and a corresponding strain upon staff and storage accommodation. Again, the recognition of the Station by London University as a centre where post graduate students work for higher degrees has brought still more overcrowding as this scheme developed. These students in many cases give two years' voluntary service whilst qualifying for their higher degrees, and undertake valuable pieces of research which would otherwise, for lack of staff, have to be deferred. These activities mean more and more records of experiments to be filed and stored, and more publications to be issued, and so the repercussions extend to every section of the Station.

The Pomology laboratory, for instance, which in 1929 was designed to accommodate eight workers, now has to provide bench accommodation for twenty workers, and the five members of the Insecticides and Fungicides team have to be content with crowded and inconvenient quarters. To sum up, where an average of some thirty-four workers were accommodated eight years ago, room now has to be found for sixty-one at certain seasons of the year.

The Director drew attention to this matter early in the year and the whole position has been thoroughly explored by various Committees. It has finally been decided that the best solution to the difficulty would be to devote the present buildings to research purposes only, and to remove the Administrative and Technical staffs, Imperial Bureau of Fruit Production and the Library to a new block of buildings. In considering this, the increasing problem of finding a place of assembly for the large parties of growers which now frequently meet at the Station has been taken into account together with the growing need for a bigger library.

To obtain a concrete idea of the room required, sketch plans embodying all these requirements have been prepared by our architect, Major H. P. G. Maule, and at the time of going to press the question of ways and means is being explored.

All the buildings have been maintained in good order and repair. The Farm Buildings, including the large Packing and Grading Shed, have been repainted during the year and the opportunity was taken to repaint all Greenhouses. It was found necessary to replace the east section of the Orchard House. It should be noted that this house was erected at a period of high costs and when little money was available ; the structure has given good service and the repairs now carried out have added considerably to the life of the building.

The main approach and farm road had the annual covering of tar and granite chips and at the same time the quadrangle was also treated.

An extension to Newgates Shed has been provided for the packing of experimental material. This was necessitated by the fact that the whole of the existing Packing Shed is now required for grading and marketing fruit.

Owing to the increased activities of the Insecticide and Fungicide team, an additional electric main has been laid to the Manwaring Building and the first floor re-wired in compliance with the latest Government regulations.

STAFF.

The Director and Mrs. Hatton arrived home from South Africa on the 14th April. In the course of just over seven weeks a very considerable area of country was visited and a wide range of problems considered. The South African authorities have expressed their appreciation of the time and thought given to their problems and have now published Dr. Hatton's report thereon.

The fact that during 1936 the University of London has conferred three higher degrees in Horticulture is a great encouragement to workers in that science. Mention has been made elsewhere of the D.Sc. degree conferred on Dr. H. V. Taylor, the Ministry's representative on our Executive Committee, and of the Ph.D. awarded to Miss J. Hearman. We were also very pleased to learn that the degree of Doctor of Science (Horticulture) had been conferred on the Director and congratulate Dr. Roach on the degree of Doctor of Science (Botany) conferred on him during the year.

The Worshipful Company of Fruiterers showed their appreciation of the practical value of the Station's work by presenting the Director with the Ridley Medal.

Mr. Cyril Cornford, who had been doing voluntary work on Frost Damage, was appointed in January to a temporary post to continue Horticultural Meteorological Investigations. Mr. B. F. G. Levy continued his voluntary work with Dr. Roach on Tree Injection Experiments until June, when we were glad to be able to offer him a temporary appointment. We wish them both continued success in their respective spheres of work.

We are indebted to Mr. A. L. Tackley for several months' voluntary assistance to Dr. Roach's spectrographic work in which his wide electrical experience was invaluable and we wish him every success in his new position.

The Staff Council elected Mr. M. H. Moore as its representative for the year and Dr. W. A. Roach as its Secretary.

The Director would like to take this opportunity of expressing his thanks to those staff committees which have undertaken to deal with matters arising out of the Library and Mailing List (Chairman, Mr. R. V. Harris), Photography (Chairman, Mr. W. S. Rogers), Orchard and Greenhouse (Chairman, Dr. A. M. Massee) and Insecticides and Fungicides (Convener, Dr. Shaw).

We have been fortunate in arranging another exchange of workers with the Dominion of Canada. Mr. T. N. Hoblyn was invited to pay a year's visit to the Dominion Experimental Farm at Ottawa whilst Mr. H. Hill came from that Station to East Malling. An opportunity was afforded for the two workers to meet in Canada. Mr. and Mrs. Hill then sailed for England and we were glad to welcome them at East Malling in July.

Mr. Hoblyn, with the assistance of a research grant from the Leverhulme Trustees, will be returning next autumn via California and Trinidad in order to add to his experience of Plot Layout of Citrus and Tropical Crops in those areas.

Miss M. E. Renwick left us in December to make preparations for her approaching marriage and, while wishing her every happiness, we thank her most sincerely for all her work in the Pomology Section.

Miss C. L. Jary, who came as a temporary assistant recorder in April, left us in November on securing a position as Instructor in Horticulture at the Queen Bertha School, Birchington. We thank her for her help during the summer months and wish her success in her new work.

We are pleased to welcome Miss M. G. Webb, Miss C. P. Field and Miss E. C. Thompson who have joined the Pomology staff as assistants.

The experiment begun in 1932 of selecting and training girls from the elementary schools in the neighbourhood, to assist in the taking of field records, has proved definitely successful. Miss E. C. M. Ashdown, Miss F. Hodge, Miss M. E. J. Broad and Miss G. M. Head have, under the supervision of Miss Beakbane, been a valuable addition to the recording team.

The provision of better facilities for photography, whilst concentrating all the negative, printing and slide work at the Institute, has emphasized the great expansion of these activities. It is no longer possible for Miss K. Cornford to cope with the demands in her spare time, and this work, at which she has become proficient, is now her first duty.

Changes amongst the junior clerical staff and laboratory assistants are perhaps inevitable and we were sorry to lose Miss M. Ray, Messrs. J. W. Jell, G. H. Bundock, P. Hills and R. A. Potter. We wish them success in their new work.

We welcome in their place Miss M. I. Sunnuck, Miss J. D. Martin, and Messrs. G. Trowel and C. H. W. Slater ; Messrs. R. A. Ward and F. Cronk and Miss R. Hoar have also been appointed as additional laboratory assistants.

The Imperial Bureau of Fruit Production have to report the loss of their chief typist, Miss F. H. Whitehead, on the occasion of her marriage. We wish Miss Whitehead every happiness. Miss M. B. Rogers has succeeded her.

Postgraduate and Overseas Workers.

Five members of staff and five postgraduates are registered as candidates for higher degrees at the University of London, and three other postgraduates have been registered as internal students of the University. During the year we have had nine long period and thirty short period students working here, seven of whom are still with us.

Our congratulations to Miss Joan Hearman, Australia, on being awarded a Ph.D.(Hort.) of the University of London last July for a thesis on " The Northern Spy as a Rootstock when compared with other Standardized European Rootstocks ". Miss Hearman, who had been with us since December, 1933, returned in July to take up an appointment in West Australia, taking with her our best thanks for her many services to the Station, and our good wishes for a successful career. Mr. F. Forster returned to Palestine in August to resume his duties with the United Tree Nursery, Ain Harod, Palestine. Mr. J. H. Brair has returned to his duties with the Department of Agriculture and Forests, Palestine. We are grateful to Mr. Forster for much good work with the Pomology Section, and to Mr. Brair for his enthusiastic co-operation in the Blossom Weevil and Codling Moth experiments, and for general help in the Entomological Section. Dr. P. K. Sen, Mr. D. N. Srivastava and Mr. W. T. Chang are still with us.

We welcome Mr. G. H. L. Dicker who came to us from the Imperial College in March and is attached to the Entomological Section.

We are glad to welcome Mr. A. A. Gawad Hassan, Technical Assistant, Insects Section, Ministry of Agriculture, Egypt, who came here in October last to gain an insight into our spraying technique and who has been attached to the Insecticides and Fungicides Section. Mr. L. W. Tiller of the Fruit Research Orchard, Appleby, New Zealand, has paid us several prolonged visits since his arrival in England last summer, and has made many friends here by his enthusiastic co-operation in our recording work, and by his stimulating contributions to our research discussions. We would also like to express our thanks to the following postgraduate workers who have given us their help unstintingly in the course of the season : Miss M. E. King (Cambridge University), Miss C. L. Bryden (Reading University), Mr. S. Bialobok (Poland), Mr. C. C. Webster (Burma), Miss R. F. Stern, Mr. R. Bushnell (Wye), Mr. J. H. Jefferson (Oxford University), Mr. J. Paine, Mr. R. J. Bray and Mr. F. W. Cope (all of the Imperial College), Mr. J. J. Astrego (Holland), Mr. O. Polunin (Oxford University), Mr. E. J. Gregory (Trinidad) and Mr. L. Voss (Sweden).

Staff Meetings for Research Discussions.

A symposium on the Codling Moth, its life history and control, was held in the spring, 1936. In view of the impending joint staff meetings with the staff of Long Ashton Research Station, the remaining meetings were devoted to a detailed discussion of our research programme, and Messrs. N. H. Grubb and M. C. Vyvyan organized the series. The meetings were well attended and the discussions lively.

The weekly meeting of the Pomological Section, which is attended by others interested, especially members of the Physiology and Bio-Chemistry Sections, has proved exceptionally useful under the guidance of Messrs. J. Amos and T. N. Hoblyn.

Social Activities.

The Christmas Party held on 11th January proved as popular as ever, and with an attendance of over 200 our small packing shed was taxed to its limits. The summer

outing to Margate on 16th July was one of the most successful days of this kind that we have had.

The cricket season proved unexpectedly successful both in regard to the number of games played and the number of wins. The Manwaring Match was played at West Malling on 13th July and resulted in a win for the visitors by 72 runs. Although we are still without our own ground the Committee have made provision for a practice net. We are indebted to Mr. Alfred Day of Headcorn for giving us the turf. Tennis was very popular, the hard court proving its worth in the wet weather by its quick-drying properties.

Collaboration.

Joint discussion with Long Ashton Research Station.

A joint discussion with Long Ashton of our respective research programmes took place in May when thirty members of our staff travelled to Bristol for a three-day visit. Although there had been valuable sectional meetings from time to time, this was unavoidably the first full gathering of both staffs since 1930, and it therefore proved of exceptional importance. A number of points of common interest were discussed from various angles, attention being given to the elimination of unnecessary duplication, and the encouragement of complementary projects where wide differences of environment were likely to be of value. We were also given opportunities for seeing the progress of the field experiments at Long Ashton.

Pomology and General.

The mosaic-free raspberry cane nurseries at the County Farm Institutes of Kent, East and West Sussex are flourishing under the care of Mr. R. Hart, Mr. G. C. Johnson and Mr. F. W. Costin. The daughter nursery of clonal strawberries at the East Sussex Farm Institute, Plumpton, under the care of Mr. G. C. Johnson continues to give very satisfactory results.

In connection with the Fruit Soils Surveys, trial plots of apple trees on known stocks were planted out this year on certain known soil series in Kent, in collaboration with Mr. W. G. Kent and Mr. B. S. Furneaux.

In collaboration with Dr. C. West of Ditton Laboratory, a storage experiment has been started this year using fruit of Cox's Orange Pippin taken from our youngest apple manurial experiment.

In collaboration with Mr. F. Hirst, Campden Research Station, consignments of loganberries and blackberries from clonal plants have been sent to Campden for investigation of their canning qualities.

As in previous seasons, the section is indebted to Dr. T. Wallace of Long Ashton for valuable advice and collaboration in many aspects of our work connected with plant nutrition, and for the hospitality which his department has extended to several of our workers.

Plant Breeding and New Varieties.

The joint work in the trial of new seedling hop varieties has been continued in collaboration with Professor E. S. Salmon and Mr. A. H. Burgess of Wye College.

Collaboration with Mr. M. B. Crane of the John Innes Horticultural Institution in the breeding of new races of rootstocks resistant to Woolly Aphis has been continued. Mr. Crane has also sent us a number of his strawberry seedlings for pomological and pathological tests.

Horticultural Meteorological Investigations.

Special thanks are due to Mr. E. G. Bilham of the Meteorological Office, Air Ministry and Mr. E. L. Davies, of the Meteorological Department, Experimental Station, Porton, for the interest they have shown and guidance they have given in the development of these micro-climatological studies, and to the Instruments Department for the loan of certain apparatus. Thanks are also due to Messrs. George Monro and Messrs. Shell-Mex, Ltd., for making it possible for us to initiate a preliminary study of the technique for Orchard Heating Experiments by supplying gratis the necessary apparatus and fuel respectively.

Physiology.

Dr. H. L. Pearse of the Physiological Department of the Imperial College has continued to give his full time to research in the Physiology Section, thus maintaining that close collaboration with Professor V. H. Blackman and his staff which has been so valuable to us in the past.

Bio-Chemistry.

Mr. Marsden, of the Imperial College of Science, is collaborating with this section in an attempt to make the polarographic method suitable for routine analysis of the minerals contained in plants. In collaboration with Dr. A. C. Hulme of the Ditton Laboratory, various substances have been injected into apple trees to test the effect on the chemical composition and keeping quality of the fruit. Dr. T. Wallace of the Long Ashton Research Station is examining the keeping quality of apples from trees which have been injected by this section with boron compounds with special reference to its possible effect on Bitter Pit. The effect on disease resistance of various injections into apple trees is being studied by Dr. A. S. Horne of the Imperial College of Science on fruit from trees at East Malling.

Plant Pathology.

In further collaboration with Dr. G. H. Berkeley of the Dominion Laboratory of Plant Pathology, St. Catharine's, Ontario, Canadian peaches and plums were examined for the incidence of diseases in order to ascertain whether soft fruit can be transported from Canada to this country without serious wastage.

Mr. R. V. Harris has collaborated with Mr. B. S. Furneaux of Wye College on the soil aspects of Verticillium Wilt of hops, and with Mr. Furneaux and the County Advisory Officers of Kent, and East Sussex on non-parasitic forms of cane failure in raspberries and loganberries. Mr. Harris has collaborated with Mr. R. Hart, Kent Farm Institute, in an investigation of " pseudo-shot hole " in cherry trees. A joint progress report on the first three years' collaborative study of strawberry virus disease in Ontario, with Dr. A. A. Hildebrand of the Dominion Laboratory of Plant Pathology, St. Catharine's, Ontario, has been completed during the year.

Mr. M. H. Moore and Mr. T. N. Hoblyn have continued to collaborate with the Essex County Advisory Officers, Messrs. H. Fraser and O. G. Dorey, in their investigation into the causes of branch-blistering of apple trees in Essex.

Entomology.

Dr. Massee has for a fourth season been supplied by Imperial Chemical Industries with a series of chemically impregnated tree bands which have been prepared as the result of joint conversations.

Insecticides and Fungicides.

Mr. W. Steer has continued to collaborate with Dr. F. Tattersfield of the Department of Insecticides and Fungicides at Rothamsted in a joint piece of biological work on the properties of Derris Root.

The invaluable assistance of the Fuel Research Station, Greenwich, has again been afforded to Dr. H. Shaw and Mr. W. Steer in their survey of the ovicidal properties of tar distillates.

Outside Trials.

The Entomological Section again conducted trials on the control of Apple Blossom Weevil and of Codling Moth at Kiln Field, East Malling, and we would express our thanks to Mr. T. J. Burbridge for allowing the trials to be carried out on his plantations.

Mr. Steer has carried out a spraying trial for Plum Sawfly on Mr. R. R. Thomson's farm at Addington.

In collaboration with Mr. W. G. Kent and Mr. C. R. Thompson, and with Dr. W. M. Ware and Mr. S. G. Jary of Wye College, observations have been made on cherry trees included in a spraying trial against Bacterial Canker, in an orchard at Herville, Wye, by kind permission of Messrs. A. B. and J. Long.

Two visits were paid to Spriver's Farm, Horsmonden, for recording the experimental set of cherries on selected layered cherry stocks which was planted for us in January, 1930, by Mr. P. Manwaring.

A visit has been paid to the Morello Cherry rootstock trial planted by Mr. D. J. Moor, Nichol Farm, Teynham, and growth records have been taken.

The mosaic-free raspberry nurseries and the clonal strawberry runner nurseries planted and maintained by Mr. T. Neame, Faversham, and by Mr. A. Amos, Wye, were visited and rogued. Mr. A. Amos has extended his runner bed of our clonal Royal Sovereign strawberry.

The Bio-Chemistry section has continued the trials on chlorosis at the Swanley Horticultural College in collaboration with members of the College staff, and has also continued its trials in chlorosis of cherry trees in Mr. Leslie Doubleday's orchard at Sittingbourne. In collaboration with Mr. R. Hart trials have been started on plum and cherry trees which do not bear satisfactorily.

In these trials the injection method is being used for a first diagnosis. The Bio-Chemistry section is also collaborating with Messrs. W. G. Kent and C. R. Thompson in some trials at Horton Kirby (Mr. W. Rogers), at Sutton Valence (Mr. J. W. B. Gladstone) and at West Peckham (Mr. A. A. Corfe) where injection and other methods are being used.

The Bio-Chemistry section is collaborating with Messrs. H. W. Abbiss and E. Beckley, County Advisory Officers in Cornwall, and with Mr. W. F. Cheal, County Advisory Officer in the Isle of Ely, in experiments which these officers are carrying out in their respective counties to test the practical application of injection methods to fruit-growing problems in their areas.

In connection with the experimental sets of grafted walnut trees a questionnaire has been circulated to the owners as to the condition of the trees and a report is shortly to be drawn up.

We should like to take this opportunity of thanking the growers and others who have made these outside trials possible.

Advisory Work.

Correspondence.

1,929 letters were written on advisory matters in the course of the year in answer to enquiries, of which 557 came from Kent, 161 from Sussex, 86 from Surrey, 967 from other parts of the United Kingdom and 140 from overseas. An analysis of the majority of the enquiries received in the course of the year shows that over 50 per cent. were concerned with pomological problems.

The telephone continues to play a prominent part in our advisory service, especially during the spraying season. When making enquiries by telephone our members would be doing a service to the research staff by addressing all enquiries in the first instance to the Technical Section. (Tel. : Aylesford 7294.)

Visits.

A total of 165 visits was paid by the staff in the course of the year, 104 of these being to growers in Kent. On several occasions members of our staff have paid joint visits to growers with the County Advisory Staff, and in this connection we would again express our thanks to Mr. W. G. Kent, and his assistant, Mr. C. R. Thompson, to Mr. R. Hart and to Mr. B. S. Furneaux for their friendly co-operation in all advisory matters. In the course of the year Mr. Kent and Mr. Thompson paid 600 visits to growers in the county and this close liaison between them and the practical growers has proved of great value to our staff. Mr. N. H. Grubb, Mr. R. V. Harris and Mr. W. S. Rogers visited the daughter nurseries of clonal raspberries and strawberries in Kent and Sussex. Mr. Rogers visited the East Anglian Institute of Agriculture, Chelmsford, to see some Malling moisture meters with which Messrs. H. Fraser and O. G. Dorey obtained interesting results last year. Miss A. B. Beakbane, Mr. N. B. Bagenal, Mr. H. C. Chapelow and Mr. W. G. Kent paid a most interesting visit to a number of apple cordon plantations in Essex under the guidance of Mr. W. P. Seabrook. A tour of soft fruit areas in the West was made in September by Messrs. Grubb, Harris and Rogers, to visit fruiting plantations and propagation centres planted with material from this Station, under varying conditions. Generally speaking, it was found that where there was adequate isolation from sources of disease infection, the health and vigour of the plants had been well maintained. Dr. H. Shaw, Mr. M. H. Moore, Mr. W. Steer and Mr. H. B. S. Montgomery visited the Imperial Chemical Industries' Field Station at Jealott's Hill in August to see the work there and to discuss laboratory methods for evaluating fungicides. The visit of East Malling research staff to Long Ashton is referred to elsewhere.

Various members of the staff have acted as judges at the following commercial fruit shows : The Imperial Fruit Show, Sittingbourne, Ash, Marden, Gravesend, and Rochester. Mr. J. Amos again acted as judge for the Norfolk Plantation and Orchard Competition.

Lectures, Demonstrations and Conferences.

Lectures.

Sixteen lectures were delivered by members of the staff during the year, of which fourteen were organized under the Ministry of Agriculture's Extension Lecture Scheme.

Demonstrations and Open Days.

An Open Day was held on 26th March at which some 400 fruit-growers attended. A conference was held in the morning at which Mr. C. Davies of the Agricultural Engineering

Department of Wye College read a paper on Spray Nozzles, their Design and Performance. Following a lively discussion, the Conference passed a resolution " that this meeting of fruit-growers at East Malling Research Station ask manufacturers to adopt a definite standard in measuring the size of disc apertures in spray guns or lances ". This resolution was accompanied by a request that it should be forwarded to the Ministry of Agriculture in the hope that they might bring it to the notice of the manufacturers. This was done, and two meetings of representatives of spraying machine manufacturers and importers were organized by the Ministry of Agriculture. At the first of these meetings agreement was reached on the question of the standardization of the nomenclature of the disc apertures in the nozzles of power spraying machines. At the second meeting a resolution was adopted that it is desirable in the interests of the fruit-growing industry that there should be a standard size of thread of nozzle for large power spraying machines only, and that this standard should be the half-inch British Standard Pipe (gas thread).

It seems clear from the above that the resolution passed by those who attended the Spray Nozzle Conference did something to clarify the situation with regard to standardization of disc apertures, nomenclature and size of thread in the spray nozzle.

In the afternoon, practical demonstrations were given in spraying with various types of nozzles, lances and guns. Demonstrations in framework grafting and in inarching were also given.

On 17th June an Open Day was held for residents in the district of East Malling when a small but interested gathering made the rounds of the exhibits prepared in readiness for Members' Day, 18th June.

On 9th September fine weather favoured the attendance of between four and five hundred growers at a demonstration of the latest makes of fruit-grading machines. By kind permission of the authorities the largest machines were on view at Ditton Laboratory and at a Conference held there in the afternoon Mr. J. Stoddart of the Ministry of Agriculture explained the reasons underlying recent changes in National Mark grades.

On this occasion opportunity was taken of testing the suggestion that our members might prefer to find their own way about the Station, instead of being taken in parties under the leadership of guides. From criticisms which were received it appears, however, that our members really prefer this latter method.

During the grafting season Mr. R. J. Garner demonstrated methods of frameworking to several parties of students and growers at the Station and to three growers on their own farms in Kent. Individual demonstrations were also given in pruning, walnut budding and grafting, tree injection and in the use of the soil moisture meter. On 23rd January Mr. Grubb gave a pruning demonstration at Emneth.

Conferences, etc.

Dr. A. M. Massee, Mr. J. Amos and Mr. F. H. Beard attended a Conference on Hops at Wye College on 15th January. Dr. Massee contributed to the discussion on Red Spider, and a paper by Mr. R. V. Harris on Verticillium Wilt was read. Dr. Massee and Mr. W. S. Rogers attended a Strawberry Conference at Wisbech on 16th January and contributed to the discussion.

Mr. M. H. Moore and Mr. H. B. S. Montgomery read a joint paper on their Laboratory Methods of Evaluating Fungicides at a Conference organized by the British

Mycological Society in London on 18th January. In addition to the above, Dr. H. Wormald has attended three meetings of the Plant Pathological Committee of the British Mycological Society.

At a meeting of the Wye Provincial Conference held at East Malling on 31st March, Sir Albert Howard read a paper on " The Role of Insects and Fungi in Horticulture ", and many members of the staff contributed to the lively discussion which followed.

Mr. H. M. Tydeman attended the International Congress of Plant Breeders held in Holland, 22nd to 27th June, and was elected a member of the organizing committee for the next congress to be held in Denmark.

Dr. Massee and Mr. R. M. Greenslade attended a Conference at the Forest Products Research Laboratory, Princes Risborough, on 1st October.

At a meeting of the Association of Applied Biologists held in London on 9th October, the Director, Dr. Massee, Dr. Roach, Mr. Rogers, Mr. Tydeman and Mr. Greenslade read papers at a symposium on " The Problems raised by the Woolly Aphis of the Apple—A Case for Team Research ". Mr. M. B. Crane of the John Innes Institution kindly collaborated with us by contributing to this symposium.

On 6th November Mr. Moore attended a conference held by the Association of Applied Biologists on the Relationship between Manurial Treatment and Incidence of Disease, and contributed to the discussion.

On 25th November Mr. Bagenal and Mr. Rogers attended the Wye Provincial Conference held in London and contributed to the discussion on Educational Exhibits.

The Director attended several meetings of the British Commonwealth Scientific Conference in London and has served on the Ministry's Horticultural Advisory Council, Horticultural Meteorological Sub-Committee and the Board of Studies in Horticulture, University of London.

Exhibits.

An exhibit dealing with Plum Rootstocks was staged at the Chelsea Show and at the Kent County Show, and an exhibit showing specimens of apples from trees undergoing different manurial treatments was staged at the Imperial Fruit Show on the Cheshire County Council Educational Exhibit stand by courtesy of the local educational authorities.

A comprehensive rootstock exhibit was sent to the Royal Welsh Agricultural Show at Abergele and to the R.H.S. of Ireland Show in Dublin where it was awarded a silver medal. Loan exhibits dealing with strawberry problems and with rootstocks were sent to the Royal Counties Show, to the Suffolk County Agricultural Show, to the Norfolk Commercial Show and to the Cheshire County Show. An exhibit of fruits of each of the 17 "Malling" apple rootstocks was sent to the R.H.S. Fruit Committee in September. At the request of the Kent Education Committee the Entomological Section staged an exhibit of insect pests at the Ramsgate Teachers' Summer School in August.

The Insecticides and Fungicides Section contributed an exhibit illustrating the applications of chemistry to pest and disease control to a meeting of the Scientific Society of Whitgift Middle School, Croydon, in March.

Visitors.

Visits to the Station were paid on 257 days in the year, the total number of visitors recorded amounting to 3,070. The number of organized parties was 54, this being

the highest figure yet recorded for this form of external contact, and one which gives a good idea of the increasing amount of time and organization required to deal with this side of the Station's work.

Among the parties received were the Empire Fruit Producers' Conference, one section of the British Commonwealth Science Conference, the Wisbech and District Fruit-growers' Association, the League Pomologique of Belgium, the French State Railway's Fruit-growers' Tour, the fruit tree nurserymen of the Horticultural Trades' Association, and Mr. J. Stoddart's party of County Advisory Officers from all parts of the country.

In addition to the usual periodical visits from the students of Wye College, Kent Farm Institute, and Swanley College, parties were received from Reading University, Oaklands Farm Institute, the Kent Education Committee Agricultural Day Class, East Sussex Teachers' Horticultural Classes, Stockwell College Students and Waterperry House Horticultural School, Oxford. Six parties of schoolchildren have also visited the Station this year.

The increasing interest in our work shown by the teaching profession is reflected in the number of organized visits we have received from school masters and school mistresses from Kent and neighbouring counties. This interest has been particularly marked in our own county, and during the last year, at the request of the Kent Education Committee, ten organized visits have been paid by parties of school teachers' horticultural classes. Under the guidance of Mr. Chapelow these visits have been organized into a short course of instruction in the practical application of our work to fruit growing in general, and to the teaching of biology in particular. It is gratifying to find the ready response of school teachers to scientific horticulture, but it is necessary to add that such courses of instruction find us inadequately equipped both as regards staff and horticultural material for general instructional purposes.

In addition to their other duties, Mr. Bagenal and Mr. Chapelow are still trying to cope with the increasing number of visitors, but further assistance in this section is urgently needed.

Distribution of Rootstocks and Experimental Material.

Rootstocks.

Once again we have to record an increase in the output of our stoolbeds as we have distributed a little over half a million (500,000) vegetatively propagated rootstocks during the season. This is a considerable increase on our previous maximum of four hundred thousand. By far the greater proportion of these were distributed to our fruit tree raising members in this country, but over 50,000 rootstocks went to the Empire overseas. Some fifty consignments of rootstocks and other experimental material were sent to countries outside the Empire, including one to China.

Trees and Bushes.

The comparatively small quantity of 1,620 trees were distributed, chiefly in the form of experimental sets, to trial grounds and schools at home and overseas.

Clonal bush fruits and raspberries were distributed in numerous consignments chiefly to form further nurseries. As our selected clones become more widely distributed it is proposed to curtail their comparatively large-scale propagation at East Malling.

Strawberries.

The clonal " disease-free " Royal Sovereign plants retained last season for propagation gave rise, after elimination of all doubtful plants, to a million runners which were distributed chiefly to our members, in sufficient quantities to plant an appreciable acreage. These plantings should provide valuable information as to the cropping powers of this clone under commercial conditions in practically all parts of the British Isles where strawberries are grown.

Walnuts.

Only a very few trees were available for distribution, actually one hundred and one, and these went to our members at home and to two continental research stations. Three hundred stocks of *Juglans nigra*, raised from imported seed, were distributed to nurserymen for grafting.

Hops.

Rooted sets of the new variety " Quality Hop " (OO63) have been distributed for the first time. " Fillpocket " (Z62) is being propagated as rapidly as possible ; there is a demand for this variety which we cannot supply at the present time. A representative collection of the best seedlings has been sent to a member in Canada for testing under his conditions.

Fruit.

Fruit for storage tests, canning trials and other experimental purposes has been supplied to Ditton Laboratory, the Low Temperature Station, Cambridge, Long Ashton Research Station, the Fruit Preservation Research Station, Campden, the John Innes Horticultural Institution, the Imperial College of Science, and the United Potash Company.

We were again honoured with a request from the Worshipful Company of Fruiterers to supply apples and pears for presentation to the Lord Mayor at his annual dinner to the Company at the Mansion House in October.

Station's Publications.

Forty-three scientific papers and two bulletins of a popular nature were published during the year ; the titles and summaries of these papers appear in the Annual Report. A certain number of sets of the Annual Report from 1924 to 1933 inclusive are available on application to the Secretary. A complete list of available publications, together with their price, can also be obtained from the same source.

Journal of Pomology and Horticultural Science.

The executive and editorial work is still being done at the Station, Professor B. T. P. Barker acting as Joint Editor. Dr. G. H. Pethybridge has agreed to join the Publication Committee and has, during the latter part of the year, been helping the Joint Acting Editors in preparing the later numbers for publication. His help has been much appreciated.

The Journal has been able to pay off its outstanding debt of £73 to East Malling, incurred as normal running expenditure.

LIBRARY.

The Library continues to be administered by a Staff committee in co-operation with the Imperial Bureau of Fruit Production. With the rapid growth of the staff and of the library the executive duties which are now being discharged under this administration entail the reception, indexing, shelving and weekly notification of all new books, periodicals and bulletins; the ensuring of their maximum availability not only to the permanent staff but to newly arrived postgraduate students by an adequate labelling, shelf-classification, and borrowing system; the tracing of particular publications for persons unable to find them; the discovery and location of publications not in the library, and obtaining these on loan when possible; the arranging for the binding of periodicals and books where necessary, and for the storage of the remainder; an annual stocktaking of all books; the running of the "Interchange of Publications System", comprising the circulation of mailing lists to members of staff, correspondence with and mailing of Annual Reports and other publications to interchange institutions and individual research workers. To give one instance of the work involved, over 200 periodicals (many of them weekly), and some 740 bulletins were dealt with in the course of the year. These duties at present devolve, as part time work, on two members of the administrative staff, one of the Research Station, and one of the Bureau, under the joint direction of the chairman of the Library Committee (a member of the research staff) and the Chief Officer of the Bureau.

The working of the library during the past year or two under the increasingly rapid flow of books, bulletins, etc., has not been altogether satisfactory, and there is a strong case, from the point of view both of efficiency and of economy, for centralizing the work in the hands of a librarian.

Attention should also be called to the very seriously congested condition of the present library. At the present rate of expansion, allowing for all possible additions to the existing shelves, all available space will soon be occupied. In the meanwhile, the drastic re-arrangement of existing books and periodicals, now frequently necessary to make way for the new arrivals, throws an additional load on the administration and is seriously impairing the usefulness of the library.

In conclusion we would express our gratitude to Professor W. L. Howard of the University of California for continuing to send us the current numbers of *Science*.

We are indebted to Dr. H. B. Tukey of Geneva, New York, for sending the fortnightly periodical *The Rural New Yorker*, to Mr. C. G. A. Nix of Crawley, Sussex, for *The Apples of England*, by H. V. Taylor, and to Dr. H. Wormald for *A New, Practical and Easy Method of Learning the Russian Language*, by F. Alexandrow.

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